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AMENDMENT 1
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Tractors and machinery for agriculture and forestry — Serial control and communications data network —

Part 7: Implement messages application layer

AMENDMENT 1

Tracteurs et matériels agricoles et forestiers — Réseaux de commande et de communication de données en série —

Partie 7: Couche d'application de base

AMENDEMENT 1

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This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 19, *Agricultural electronics*.

Tractors and machinery for agriculture and forestry — Serial control and communications data network —

Part 7: Implement messages application layer

AMENDMENT 1

Clause 2

Add the following new normative reference:

"ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*"

A.5

Replace the first paragraph with the following:

"Actual ground speed of a machine, measured by a sensor such as that is not susceptible to wheel slip (e.g. radar, GPS, LIDAR, or stationary object tracking)."

A.6

Replace the first paragraph with the following:

"Actual distance travelled by a machine, based on measurements from a sensor such as that is not susceptible to wheel slip (e.g. radar, GPS, LIDAR, or stationary object tracking)."

A.19.7

Replace the second paragraph with the following:

"A positive value indicates the force applied to the tractor opposed to its forward direction of travel.

NOTE Forward and reverse refer to the normal directions of travel of the tractor or implement chassis. The direction does not change when the operator's perspective is changed (i.e. when operator station is reversed)."

A.19.8

Replace the second paragraph with the following:

A positive value indicates the force applied to the tractor opposed to its forward direction of travel.

NOTE Forward and reverse refer to the normal directions of travel of the tractor or implement chassis. The direction does not change when the operator's perspective is changed (i.e. when operator station is reversed).

A.19.9

Replace the last sentence of second paragraph with:

"A positive value indicates the force applied to the tractor opposed to its forward direction of travel.

NOTE Forward and reverse refer to the normal directions of travel of the tractor or implement chassis. The direction does not change when the operator's perspective is changed (i.e. when operator station is reversed)."

A.19

Add the following new subclauses after A.19.14.

A.19.15 Front hitch roll angle

Measured roll angle of the front three-point hitch expressed in degrees from horizontal alignment with the rear axle of the tractor. Facing the direction of travel, an anti-clockwise rotation would be indicated by a negative number and a clockwise rotation would be indicated by a positive number.

Data length:	2 bytes
Resolution:	0,002 °/bit, −64 degrees offset
Data range:	−64° to 64,51°
Type:	Measured
SPN:	7790

A.19.16 Front hitch roll limit status

Parameter used to report the Tractor ECU's present limit status associated with the front hitch roll commands.

Data length: 3 bits

Value	Meaning
000	Not limited
001	Operator limited/controlled (request cannot be implemented)
010	Limited High (only lower command values result in a change)
011	Limited Low (only higher command values result in a change)
100	Reserved
101	Reserved
110	Non-recoverable fault
111	Not available (parameter not supported)

Note that the limited conditions (limited high and low) could be temporary, for example when a large set point change is limited by a ramp rate. This bit can be set until the ramp is complete to prevent windup (and subsequent overshoot) due to the response of the controlled value.

A non-recoverable fault is non-recoverable from the viewpoint of the implement. Operator action within the tractor may resolve the issue and result in a change to "Operator Limited/Controlled" status.

Type:	Measured
SPN:	7791

A.19.17 Front hitch roll exit/reason code

This parameter is used to indicate why the front hitch cannot accept remote roll commands or has most recently stopped accepting remote commands.

Data length: 6 bits

Value	Meaning
000000	No reason/all clear
000001	Required level of operator presence/awareness not detected
000010	Implement released control of function
000011	Operator override of function
000100	Operator control not in valid position
000101	Remote command timeout
000110	Remote command out of range/invalid
000111	Function not calibrated
001000	Operator control fault
001001	Function fault
001010 to 010011	Reserved
010100	Hydraulic oil level too low
010101	Hitch locked out
010110 to 110000	Reserved
110001 to 111101	Manufacturer specific
111110	Error
111111	Not available (parameter not supported)

Type: Measured
SPN: 7792

A.19.18 Front hitch roll sensitivity

The current sensitivity of the front hitch roll control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length: 1 byte
Resolution: 0,4 %/bit, 0 % offset
Data range: 0 % to 100 %
Type: Measured
SPN: 7800

A.19.19 Front hitch roll command

Command for setting the roll angle of the front three-point hitch expressed in degrees with 0 being horizontally aligned with the rear axle of the tractor. Facing the direction of travel, an anti-clockwise rotation would be indicated by a negative number and a clockwise rotation would be indicated by a positive number.

Data length:	2 bytes
Resolution:	0,002 °/bit, −64 degrees offset
Data range:	−64° to 64,51°
Type:	Command
SPN:	7796

A.19.20 Front hitch roll sensitivity command

Command for setting the sensitivity of the front hitch roll control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length:	1 byte
Resolution:	0,4 %/bit, 0 % offset
Data range:	0 % to 100 %
Type:	Command
SPN:	7797

A.19.21 Front hitch pitch angle

Measured pitch angle of the front three-point hitch expressed in degrees from vertical alignment of the upper and lower attachment points. Positive is in the anti-clockwise direction when viewed from the left-hand side of the tractor.

Data length:	2 bytes
Resolution:	0,002 °/bit, −64 degrees offset
Data range:	−64° to 64,51°
Type:	Measured
SPN:	7793

A.19.22 Front hitch pitch limit status

Parameter used to report the Tractor ECU's present limit status associated with the front hitch pitch commands.

Data length:	3 bits

Value	Meaning
000	Not limited
001	Operator limited/controlled (request cannot be implemented)
010	Limited High (only lower command values result in a change)
011	Limited Low (only higher command values result in a change)
100	Reserved
101	Reserved
110	Non-recoverable fault
111	Not available (parameter not supported)

Note that the limited conditions (limited high and low) could be temporary, for example when a large set point change is limited by a ramp rate. This bit can be set until the ramp is complete to prevent windup (and subsequent overshoot) due to the response of the controlled value.

A non-recoverable fault is non-recoverable from the viewpoint of the implement. Operator action within the tractor may resolve the issue and result in a change to "Operator Limited/Controlled" status.

Type: Measured

SPN: 7794

A.19.23 Front hitch pitch exit/reason code

This parameter is used to indicate why the front hitch cannot accept remote pitch commands or has most recently stopped accepting remote commands.

Data length: 6 bits

Value	Meaning
000000	No reason/all clear
000001	Required level of operator presence/awareness not detected
000010	Implement released control of function
000011	Operator override of function
000100	Operator control not in valid position
000101	Remote command timeout
000110	Remote command out of range/invalid
000111	Function not calibrated
001000	Operator control fault
001001	Function fault
001010 to 010011	Reserved
010100	Hydraulic oil level too low
010101	Hitch locked out
010110 to 110000	Reserved
110001 to 111101	Manufacturer specific
111110	Error
111111	Not available (parameter not supported)

Type:	Measured
SPN:	7795

A.19.24 Front hitch pitch sensitivity

The current sensitivity of the front hitch pitch control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length:	1 byte
Resolution:	0,4 %/bit, 0 % offset
Data range:	0 % to 100 %
Type:	Measured
SPN:	7801

A.19.25 Front hitch pitch command

Command for setting the pitch angle of the front three-point hitch expressed in degrees from vertical alignment of the upper and lower attachment points. Positive is in the anti-clockwise direction when viewed from the left-hand side of the tractor.

Data length:	2 bytes
Resolution:	0,002 °/bit, −64 degrees offset
Data range:	−64° to 64,51°
Type:	Command
SPN:	7798

A.19.26 Front hitch pitch sensitivity command

Command for setting the sensitivity of the front hitch pitch control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length:	1 byte
Resolution:	0,4 %/bit, 0 % offset
Data range:	0 % to 100 %
Type:	Measured
SPN:	7799

A.19.27 Front hitch yaw angle

Measured yaw angle of front hitch relative to the reference frame indicated by A.19.28 parameter.

The yaw angle measurement around the yaw (z-axis) of the hitch. The yaw angle is defined to be the angle from the null position on the reference frame. A positive yaw angle results when the hitch is rotated anti-clockwise when viewing the tractor from above.

Data length: 2 bytes

Resolution: 1/128 °/bit, –200 degrees offset

Data range: –200° to 200°

Type: Measured

SPN: 9714

A.19.28 Front hitch yaw angle reference frame

This parameter is used to indicate the reference frame for the yaw angle of the front hitch.

Data length: 4 bits

Value	Meaning
0000	Main body of the machine
0001	Body of the hitch
0010	Direction of travel
0011 to 1101	Reserved
1110	Non-recoverable fault
1111	Not available (parameter not supported)

NOTE Main body of the machine reference is the recommended reference frame for all tractors with front wheel steering. Direction of travel reference frame is suitable for tractors with capability in crab steering mode. Body of the hitch reference frame is suitable for articulated tractors with front hitch.

Type: Measured

SPN: 9721

A.19.29 Front hitch yaw angle actual control mode

This parameter is used to indicate the control mode active in the tractor.

Data length: 4 bits

Value	Meaning
0000	Disabled, yaw angle is locked in a position (e.g. transport).
0001	Direct hydraulic valve control, manual operation
0010	Floating mode
0011	Automatic control: 1:1 to adjacent steering wheels
0100	Automatic control: N:1, basic curvature contour mode
0101	Automatic control: position control
0110 to 1101	Reserved
1110	Error indication
1111	Not available

Type: Measured

SPN: 9716

A.19.30 Front hitch yaw limit status

Parameter used to report the Tractor ECU's present limit status associated with the front hitch yaw commands.

Data length: 3 bits

Value	Meaning
000	Not limited
001	Operator limited/controlled (request cannot be implemented)
010	Limited High (only lower command values result in a change)
011	Limited Low (only higher command values result in a change)
100	Reserved
101	Reserved
110	Non-recoverable fault
111	Not available (parameter not supported)

Note that the limited conditions (limited high and low) could be temporary, for example when a large set point change is limited by a ramp rate. This bit can be set until the ramp is complete to prevent windup (and subsequent overshoot) due to the response of the controlled value.

A non-recoverable fault is non-recoverable from the viewpoint of the implement. Operator action within the tractor may resolve the issue and result in a change to "Operator Limited/Controlled" status.

Type: Measured

SPN: 9717

A.19.31 Front hitch yaw exit/reason code

This parameter is used to indicate why the front hitch cannot accept remote yaw commands or has most recently stopped accepting remote commands.

Data length: 6 bits

Value	Meaning
000000	No reason/all clear
000001	Required level of operator presence/awareness not detected
000010	Implement released control of function
000011	Operator override of function
000100	Operator control not in valid position
000101	Remote command timeout
000110	Remote command out of range/invalid
000111	Function not calibrated
001000	Operator control fault
001001	Function fault
001010 to 010011	Reserved
010100	Hydraulic oil level too low
010101	Hitch locked out
010110 to 110000	Reserved

Value	Meaning
110001 to 111101	Manufacturer specific
111110	Error
111111	Not available (parameter not supported)

Type: Measured

SPN: 9718

A.19.32 Front hitch yaw command

Command for setting the yaw angle of the front three-point hitch like defined in A.19.27 and A.19.28. To enable the command, Front hitch yaw angle actual control mode (see A.19.29) must be value 0101.

Data length: 2 bytes

Resolution: 1/128 °/bit, –200 degrees offset

Data range: –200° to 200°

Type: Measured

SPN: 9719

A.19.33 Rear hitch roll angle

Measured roll angle of the rear three-point hitch expressed in degrees from horizontal alignment with the rear axle of the tractor. Facing the direction of travel, an anti-clockwise rotation would be indicated by a negative number and a clockwise rotation would be indicated by a positive number.

Data length: 2 bytes

Resolution: 0,002 °/bit, –64 degrees offset

Data range: –64° to 64,51°

Type: Measured

SPN: 7802

A.19.34 Rear hitch roll limit status

Parameter used to report the Tractor ECU's present limit status associated with the rear hitch roll commands.

Data length: 3 bits

Value	Meaning
000	Not limited
001	Operator limited/controlled (request cannot be implemented)
010	Limited High (only lower command values result in a change)
011	Limited Low (only higher command values result in a change)
100	Reserved

Value	Meaning
101	Reserved
110	Non-recoverable fault
111	Not available (parameter not supported)

Note that the limited conditions (limited high and low) could be temporary, for example when a large set point change is limited by a ramp rate. This bit can be set until the ramp is complete to prevent windup (and subsequent overshoot) due to the response of the controlled value.

A non-recoverable fault is non-recoverable from the viewpoint of the implement. Operator action within the tractor may resolve the issue and result in a change to "Operator Limited/Controlled" status.

Type: Measured

SPN: 7803

A.19.35 Rear hitch roll exit/reason code

This parameter is used to indicate why the rear hitch cannot accept remote roll commands or has most recently stopped accepting remote commands.

Data length: 6 bits

Value	Meaning
000000	No reason/all clear
000001	Required level of operator presence/awareness not detected
000010	Implement released control of function
000011	Operator override of function
000100	Operator control not in valid position
000101	Remote command timeout
000110	Remote command out of range/invalid
000111	Function not calibrated
001000	Operator control fault
001001	Function fault
001010 to 010011	Reserved
010100	Hydraulic oil level too low
010101	Hitch locked out
010110 to 110000	Reserved
110001 to 111101	Manufacturer specific
111110	Error
111111	Not available (parameter not supported)

Type: Measured

SPN: 7804

A.19.36 Rear hitch roll sensitivity

The current sensitivity of the rear hitch roll control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length:	1 byte
Resolution:	0,4 %/bit, 0 % offset
Data range:	0 % to 100 %
Type:	Measured
SPN:	7812

A.19.37 Rear hitch roll command

Command for setting the roll angle of the rear three-point hitch expressed in degrees with 0 being horizontally aligned with the rear axle of the tractor. Facing the direction of travel, an anti-clockwise rotation would be indicated by a negative number and a clockwise rotation would be indicated by a positive number.

Data length:	2 bytes
Resolution:	0,002 °/bit, −64 degrees offset
Data range:	−64° to 64,51°
Type:	Measured
SPN:	7808

A.19.38 Rear hitch roll sensitivity command

Command for setting the sensitivity of the rear hitch roll control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length:	1 byte
Resolution:	0,4 %/bit, 0 % offset
Data range:	0 % to 100 %
Type:	Measured
SPN:	7809

A.19.39 Rear hitch pitch angle

Measured pitch angle of the rear three-point hitch expressed in degrees from vertical alignment of the upper and lower attachment points. Positive is in the anti-clockwise direction when viewed from the left-hand side of the tractor.

Data length: 2 bytes

Resolution: 0,002 °/bit, −64 degrees offset

Data range: −64° to 64,51°

Type: Measured

SPN: 7805

A.19.40 Rear hitch pitch limit status

Parameter used to report the Tractor ECU's present limit status associated with the rear hitch pitch commands.

Data length: 3 bits

Value	Meaning
000	Not limited
001	Operator limited/controlled (request cannot be implemented)
010	Limited High (only lower command values result in a change)
011	Limited Low (only higher command values result in a change)
100	Reserved
101	Reserved
110	Non-recoverable fault
111	Not available (parameter not supported)

Note that the limited conditions (limited high and low) could be temporary, for example when a large set point change is limited by a ramp rate. This bit can be set until the ramp is complete to prevent windup (and subsequent overshoot) due to the response of the controlled value.

A non-recoverable fault is non-recoverable from the viewpoint of the implement. Operator action within the tractor may resolve the issue and result in a change to “Operator Limited/Controlled” status.

Type: Measured

SPN: 7806

A.19.41 Rear hitch pitch exit/reason code

This parameter is used to indicate why the rear hitch cannot accept remote pitch commands or has most recently stopped accepting remote commands.

Data length: 6 bits

Value	Meaning
000000	No reason/all clear
000001	Required level of operator presence/awareness not detected
000010	Implement released control of function
000011	Operator override of function
000100	Operator control not in valid position
000101	Remote command timeout
000110	Remote command out of range/invalid
000111	Function not calibrated

Value	Meaning
001000	Operator control fault
001001	Function fault
001010 to 010011	Reserved
010100	Hydraulic oil level too low
010101	Hitch locked out
010110 to 110000	Reserved
110001 to 111101	Manufacturer specific
111110	Error
111111	Not available (parameter not supported)

Type: Measured

SPN: 7807

A.19.42 Rear hitch pitch sensitivity

The current sensitivity of the rear hitch pitch control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length: 1 byte

Resolution: 0,4 %/bit, 0 % offset

Data range: 0 % to 100 %

Type: Measured

SPN: 7813

A.19.43 Rear hitch pitch command

Command for setting the pitch angle of the rear three-point hitch expressed in degrees from vertical alignment of the upper and lower attachment points. Positive is in the anti-clockwise direction when viewed from the left-hand side of the tractor.

Data length: 2 bytes

Resolution: 0,002 °/bit, −64 degrees offset

Data range: −64° to 64,51°

Type: Measured

SPN: 7810

A.19.44 Rear hitch pitch sensitivity command

Command for setting the sensitivity of the rear hitch pitch control expressed as a percentage of the maximum gain. 0 % indicates minimal gain in the control loop; 100 %, the maximum gain. Values near 0 may result in no reaction by the control loop.

Data length: 1 byte

Resolution: 0,4 %/bit, 0 % offset

Data range: 0 % to 100 %

Type: Measured

SPN: 7811

A.19.45 Rear hitch yaw angle

Measured yaw angle of rear hitch relative to the reference frame indicated by A.19.46 parameter.

The yaw angle measurement around the yaw (z-axis) of the hitch. The yaw angle is defined to be the angle from the null position on the reference frame. A positive yaw angle results when the hitch is rotated anti-clockwise when viewing the tractor from above.

Data length: 2 bytes

Resolution: 1/128 °/bit, –200 degrees offset

Data range: –200° to 200°

Type: Measured

SPN: 9720

A.19.46 Rear hitch yaw angle reference frame

This parameter is used to indicate the reference frame for the yaw angle of the rear hitch.

Data length: 4 bits

Value	Meaning
0000	Main body of the machine
0001	Body of the hitch
0010	Direction of travel
0011 to 1101	Reserved
1110	Non-recoverable fault
1111	Not available

NOTE Main body of the machine reference is the recommended reference frame for all tractors with front wheel steering or articulated steering. Direction of travel reference frame is suitable for tractors with rear wheel steering capability in crab steering mode. Body of the hitch reference frame is suitable for special tractors.

Type: Measured

SPN: 9721

A.19.47 Rear hitch yaw angle actual control mode

This parameter is used to indicate the control mode active in the tractor.

Data length: 4 bits

Value	Meaning
0000	Disabled, yaw angle is locked in a position (e.g. transport).
0001	Direct hydraulic valve control, manual operation
0010	Floating mode
0011	Automatic control: 1:1 to adjacent steering wheels
0100	Automatic control: N:1, basic curvature contour mode
0101	Automatic control: position control
0110 to 1101	Reserved
1110	Error indication
1111	Not available

Type: Measured

SPN: 9722

A.19.48 Rear hitch yaw limit status

Parameter used to report the Tractor ECU's present limit status associated with the rear hitch yaw commands.

Data length: 3 bits

Value	Meaning
000	Not limited
001	Operator limited/controlled (request cannot be implemented)
010	Limited High (only lower command values result in a change)
011	Limited Low (only higher command values result in a change)
100	Reserved
101	Reserved
110	Non-recoverable fault
111	Not available (parameter not supported)

Note that the limited conditions (limited high and low) could be temporary, for example when a large set point change is limited by a ramp rate. This bit can be set until the ramp is complete to prevent windup (and subsequent overshoot) due to the response of the controlled value.

A non-recoverable fault is non-recoverable from the viewpoint of the implement. Operator action within the tractor may resolve the issue and result in a change to “Operator Limited/Controlled” status.

Type: Measured

SPN: 9723

A.19.49 Rear hitch yaw exit/reason code

This parameter is used to indicate why the rear hitch cannot accept remote yaw commands or has most recently stopped accepting remote commands.

Data length: 6 bits

Value	Meaning
000000	No reason/all clear
000001	Required level of operator presence/awareness not detected
000010	Implement released control of function
000011	Operator override of function
000100	Operator control not in valid position
000101	Remote command timeout
000110	Remote command out of range/invalid
000111	Function not calibrated
001000	Operator control fault
001001	Function fault
001010 to 010011	Reserved
010100	Hydraulic oil level too low
010101	Hitch locked out
010110 to 110000	Reserved
110001 to 111101	Manufacturer specific
111110	Error
111111	Not available (parameter not supported)

Type: Measured

SPN: 9724

A.19.50 Rear hitch yaw command

Command for setting the yaw angle of the rear three-point hitch like defined in A.19.45 and A.19.46. To enable the command, Rear hitch yaw angle actual control mode (see A.19.47) must be value 0101.

Data length: 2 bytes

Resolution: 1/128 °/bit, –200 degrees offset

Data range: –200° to 200°

Type: Measured

SPN: 9725

A.21

Add the following new subclauses after A.21.50.

A.21.51 Auxiliary valve number 0 high resolution estimated flow

Value reported by the controller of flow out of an auxiliary valve 0 of a tractor which could be based on the commanded position of the valve.

0 % indicates no flow, 100 % indicates maximum flow out the extend port, –100 % indicates maximum flow out the retract port. Caution should be exercised when using this parameter in feedback control systems because this parameter is estimated and not measured.

Data length: 2 bytes

Resolution: 0,004 %/bit, –125 % offset

Data range: –125 % to +132,02 %

Operating range: –100 % to +100 %

Type: Estimated

SPN: 9732

A.21.52 Auxiliary valve number 0 Resolution mode — Command

Command to identify whether the extended resolution valve command (defined in A.21.53) is valid

Data length: 2 bits

Value	Meaning
00	Standard resolution parameter only (see A.21.10)
01	Extended and standard resolution parameters are valid
10	Reserved
11	Don't care

Type: Status

SPN: 7872

A.21.53 Auxiliary valve number 0 port flow — Extended Resolution Command

Extended resolution command for setting the flow through the extend or retract port of auxiliary valve 0 of a tractor, expressed as a percentage of full flow.

0 % indicates no flow, 100 % indicates maximum flow; the flow returns to the tractor through the opposite port.

When this parameter is set to anything other than “not available” (all 1’s), it contains a valid value. The low resolution parameter will also contain a valid (lower resolution) value.

Data length: 2 bytes

Resolution: 0,001 562 5 %/bit, 0 % offset

Data range: 0 % to 100,398 437 5 %

Operating range: 0 % to 100 %

Type: Command

SPN: 7856

A.21.54 Auxiliary valve number 15 high resolution estimated flow

Value reported by the controller of flow out of an auxiliary valve 15 of a tractor which could be based on the commanded position of the valve.

If this parameter is “not available” (all 1’s) then only the original resolution parameters (see A.21.20 and A.21.21) are populated.

0 % indicates no flow, 100 % indicates maximum flow out the extend port, –100 % indicates maximum flow out the retract port. Caution should be exercised when using this parameter in feedback control systems because this parameter is estimated and not measured.

Data length: 2 bytes

Resolution: 0,004 %/bit, –125 % offset

Data range: –125 % to +132,02 %

Operating range: –100 % to +100 %

Type: Estimated

SPN: 9747

A.21.55 Auxiliary valve number 15 Resolution mode — Command

Command to identify whether the extended resolution valve command (defined in A.21.56) is valid.

Data length: 2 bits

Value	Meaning
00	Standard resolution parameter only (see A.21.26)
01	Extended and standard resolution parameters are valid
10	Reserved
11	Don't care

Type: Status

SPN: 7887

A.21.56 Auxiliary valve number 15 port flow — Extended Resolution Command

Extended resolution command for setting the flow through the extend or retract port of auxiliary valve 15 of a tractor, expressed as a percentage of full flow.

0 % indicates no flow, 100 % indicates maximum flow; the flow returns to the tractor through the opposite port.

When this parameter is set to anything other than “not available” (all 1’s), it contains a valid value. The low resolution parameter will also contain a valid (lower resolution) value.

Data length: 2 bytes

Resolution: 0,001 562 5 %/bit, 0 % offset

Data range: 0 % to 100,398 437 5 %

Operating range: 0 % to 100 %

Type: Command

SPN: 7871

A.21.57 General-purpose valve extend port high resolution estimated flow

The value reported by the controller of flow through the extend port of a general-purpose valve, which could be based on the commanded position of the valve.

If this parameter is "not available" (all 1's) then only the original resolution parameters (see A.21.35 and A.21.36) are populated.

0 % indicates no flow, 100 % indicates maximum flow, –100 % indicates maximum flow returning to the valve through this port. Caution should be exercised when using this parameter in feedback control systems because this parameter is estimated and not measured.

Data length:	2 bytes
Resolution:	0,004 %/bit, –125 % offset
Data range:	–125 % to +132,02 %
Operating range:	–100 % to +100 %
Type:	Estimated
SPN:	9728

A.21.58 General-purpose valve retract port high resolution estimated flow

The value reported by the controller of flow through the retract port of a general-purpose valve, which could be based on the commanded position of the valve.

If this parameter is "not available" (all 1's) then only the original resolution parameters (see A.21.35 and A.21.36) are populated.

0 % indicates no flow, 100 % indicates maximum flow, –100 % indicates maximum flow returning to the valve through this port. Caution should be exercised when using this parameter in feedback control systems because this parameter is estimated and not measured.

Data length:	2 bytes
Resolution:	0,004 %/bit, –125 % offset
Data range:	–125 % to +132,02 %
Operating range:	–100 % to +100 %
Type:	Estimated
SPN:	9729

A.21.59 General-purpose valve port flow — Extended Resolution Command

Command for setting the flow through the extend or retract port of a general-purpose valve, expressed as a percentage of full flow.

0 % indicates no flow, 100 % indicates maximum flow; the flow returns to the tractor through the opposite port.

The low resolution parameter shall always be set to a value representing the current status of the valve. When this parameter contains "not available", only the low resolution parameter is valid. When it is set to anything other than "not available", it contains a valid value as well.

Data length: 2 bytes

Resolution: 0,001 562 5 %/bit, 0 % offset

Data range: 0 % to 100,398 437 5 %

Operating range: 0 % to 100 %

Type: Command

SPN: 9727

A.21.60 General-purpose valve exit/reason code

This parameter is used to indicate why the general purpose valve cannot accept remote commands or has most recently stopped accepting remote commands.

Data length: 5 bits

Value	Meaning
00000	No reason/all clear
00001	Required level of operator presence/awareness not detected
00010	Implement released control of function
00011	Operator override of function
00100	Operator control not in valid position
00101	Remote command timeout
00110	Remote command out of range/invalid
00111	Function not calibrated
01000	Operator control fault
01001	Function fault
01010 to 01111	Reserved
10000	Hydraulic oil level too low
10001	Valve locked out
10010 to 11101	Manufacturer specific
11110	Error
11111	Not available (parameter not supported)

Type: Measured

SPN: 9730

A.23

Replace A.23.1 with the following:

A.23.1 Language

The language is defined by a Language code optionally extended by a Country code.

The optional country code can be used to specify dialects.

EXAMPLE Spanish-Mexico: es-MX; Spanish-Argentina: es-AR.

A.23.1.1 Language code

Command sent to all ECUs specifying the operator's desired language of information.

ISO 11783 networks shall use the two-letter language codes in accordance with ISO 639.

EXAMPLE Dutch: nl; French: fr; English: en; German: de.

Data length: 2 bytes

Resolution: 7 bit ISO Latin 1 characters (lower case)

Type: Command

SPN: 2410

A.23.1.2 Country code

Command sent to all ECUs specifying the operator's desired language dialect.

ISO 11783 networks shall use the alpha-2 country codes in accordance with ISO 3166-1.

When both characters are set to all 1's it indicates that no country code is specified.

EXAMPLE Netherlands: NL; France: FR; United Kingdom: GB; United States: US; Germany: DE

Data length: 2 bytes

Resolution: 7 bit ISO Latin 1 characters (upper case)

Type: Command

SPN: 9731

A.28

Add the following subclause after A.28.9:

A.28.10 Guidance system remote engage switch status

State of the Remote Engage Switch. This allows the vehicle to provide its own engage switch for the Guidance system.

Data length: 2 bits

Value	Meaning
00	Disengage guidance commands
01	Engage guidance commands
10	Error indication
11	Not available/Take no Action

Type: Measured

SPN: 9726

A.35

Add the following subclause after A.34:

A.35 Operator presence parameters

A.35.1 Operator status sequence counter

The operator status sequence counter is a counter of the messages transmitted by the transmitting Control Function on the network, not of the time elapsed between the messages, and therefore conveys no information about the message interval time. After a power on or reset of the transmitting control function, the SPN value shall be set to 251 to indicate the reset of this counter. From there, the SPN value shall roll over to 0 and continue to increase in increments of 1 to a maximum value of 250, then roll over to a value of 0 and continue incrementing (modulus 250).

The operator status sequence counter shall be incremented by one (1) for each operator status PGN transmitted by one control function containing updated data. The value shall be independent for each transmitter. This parameter shall be used by the receiving control functions to determine whether the operator status transmitter has maintained a valid network connection and whether the operator status transmitter is the only control function that transmits the message originating from this control function's source address.

The operator status sequence counter value of 251 shall be used to indicate a reset of the counter (typically caused by a reset of the transmitting control function).

The operator status sequence counter values of 252 to 253 are reserved for future definition.

An operator status sequence counter value of 254 (0xFE) indicates an error.

An operator status sequence counter value of 255 (0xFF) indicates that this SPN as well as the other SPNS in this message are "not available".

When a recipient of the operator status first receives an operator status PGN from the network, it shall use the current value of this parameter as the initial value of the operator status sequence counter value.

The following rules shall be used by each control function that uses the operator status PGN to evaluate the operator status sequence counter values.

a) If the currently received and the previously received operator status messages contain the same operator status sequence counter values, but are unequal to 255, then the recipient shall treat the currently received message as in an operator status sequence error state.

b) If the currently received operator status message operator status sequence counter value is in the range of 252 to 253, then the recipient shall ignore the message. Future definitions may require processing but as long as these operator status sequence counter values are reserved they shall be ignored.

c) If the currently received operator tatus message operator status sequence counter value is 254, then the recipient shall treat the message as in operator status transmission error state.

d) If the currently received operator status message operator status sequence counter value is 251, then the recipient shall recognize that the transmitting CF has reset. This reset state triggers the receiving control function to synchronize it's message counter to the value transmitted by the transmitting control function.

e) If the current received operator status message operator status sequence counter value is 255, but the previously received value is not equal to 255, the recipient shall treat the message as in operator status graceful shutdown intialization state.

f) If the currently received operator status message operator status sequence counter value is incremented by more than 3, taking into account the roll-over at 250, from the previously received operator status message operator status sequence counter value, then the Receiver shall treat the message as in operator status sequence error state. This rule allows for missing up to 3 operator status messages before the recipient enters an operator status sequence error state.

g) If the operator status PGN recipient has detected and entered the operator status sequence error state, it shall listen for 8 correct, sequential operator status messages in a row before returning to operator status sequence operational state.

Data length: 8 bits

Value	Meaning
0x0-0xFA	Counter values (incrementing by 1, roll-over at FA_{16}: 0_{16}-1_{16}-...- FA_{16}-0_{16}-1_{16}-...)
0xFB	Reset of Operator Status Sequence Counter
0xFC - 0xFD	Reserved
0xFE	Error condition on sender
0xFF	Graceful shutdown

Type: Measured

SPN: 5141

A.35.2 Operator presence state

The Operator presence state SPN is a status indicator for the current state of the operator presence detection system. Operator status recipients may use this information to determine the appropriate system functionality.

Data length: 2 bits

Value	Meaning
00	Operator Not Present
01	Operator Present
10	Error indication
11	Not available or Not Installed

Type: Measured

SPN: 9711

A.35.3 Operator awareness state

The operator awareness state SPN is a status indicator for the current state of the operator awareness detection system. Operator status recipients may use this information to determine the appropriate system functionality.

Data length: 2 bits

Value	Meaning
00	Operator Not Aware
01	Operator Aware
10	Error indication
11	Not available or Not Installed

Type: Measured

SPN: 9712

A.35.4 Operator presence and awareness status checksum

The operator presence and awareness status checksum is the CRC checksum of the first 56 data bits of the operator status message using the CRC-8-CCIT Polynomial (0x07/0xE0/0x83). This CRC is used to verify that transmitted data was not corrupted prior to transmission over the CAN bus.

An operator status message which fails a checksum test shall be treated as indicating an operator status sequence error. This means that if an operator status message is received which fails the checksum test, the receiving device shall treat the operator status presence and awareness states as if value 2 ("error indicator") is received.

If the operator status PGN recipient has detected and entered the operator status sequence error state due to failed checksum test, it shall listen for 8 correct, sequential operator status messages in a row before returning to operator status sequence operational state.

Data length: 8 bits

Type: Measured

SPN: 9713

B.6

After B.6 add a new subtitle B.6.1 General and add the following subclauses after B.6.1:

B.6.2 Secondary or front hitch roll and pitch

This message provides roll and pitch information for the front hitch.

Transmission repetition rate: 100 ms

Data length: 8 bytes

Data page: 0

PDU format: 240

PDU specific: 255

Default priority: 3

Parameter group number: 61695 ($00F0FF_{16}$)

Bytes 1, 2: Front hitch roll angle (see A.19.15)

Byte 3: Bits 8 to 6: Front hitch roll limit status (see A.19.16)

Byte 4:	Bits 5 to 1:	Reserved
	Bits 8 to 7:	Reserved
	Bits 6 to 1:	Front hitch roll exit/reason code (see A.19.17)
Bytes 5, 6:		Front hitch pitch angle (see A.19.19)
Byte 7:	Bits 8 to 6:	Front hitch pitch limit status (see A.19.22)
	Bits 5 to 1:	Reserved
Byte 8:	Bits 8 to 7:	Reserved
	Bits 6 to 1:	Front hitch pitch exit/reason code (see A.19.23)

B.6.3 Secondary or front hitch roll and pitch sensitivity

This message provides current sensitivity of the front hitch roll and pitch control loops.

Every 100 ms on change of any parameter but no slower than 1 000 ms if no change (periodic).

Transmission repetition rate:	100 ms on change; 1 s periodic (if no change)
Data length:	8 bytes
Data page:	0
PDU format:	252
PDU specific:	15
Default priority:	6
Parameter group number:	64527 ($00FC0F_{16}$)
Byte 1:	Front hitch roll sensitivity (see A.19.18)
Byte 2:	Front hitch pitch sensitivity (see A.19.24)
Bytes 3 through 8:	Reserved

B.6.4 Secondary or front hitch roll and pitch command

This message provides control of front hitch roll and pitch.

Transmission repetition rate:	100 ms
Data length:	8 bytes
Data page:	0
PDU format:	241
PDU specific:	00
Default priority:	3
Parameter group number:	61696 ($00F100_{16}$)
Bytes 1, 2:	Front hitch roll command (see A.19.19)

Byte 3:		Front hitch roll sensitivity command (see A.19.20)
Bytes 4, 5:		Front hitch pitch command (see A.19.25)
Byte 6:		Front hitch pitch sensitivity command (see A.19.26)
Bytes 7 to 8:		Reserved

B.6.5 Secondary or front hitch yaw

This message provides yaw information for the front hitch.

Transmission repetition rate:		100 ms
Data length:		8 bytes
Data page:		0
PDU format:		251 (PDU2)
PDU specific:		131
Default priority:		3
Parameter group number:		64387 ($00FB83_{16}$)
Bytes 1, 2:		Front hitch yaw angle (see A.19.27)
Byte 3:	Bits 8 to 5:	Front hitch yaw angle reference frame (see A.19.28)
	Bits 4 to 1:	Front hitch yaw angle actual control mode (see A.19.29)
Byte 4:	Bits 8 to 6:	Front hitch yaw limit status (see A.19.30)
	Bits 5 to 1:	Reserved
Byte 5:	Bits 8 to 7:	Reserved
	Bits 6 to 1:	Front hitch yaw exit/reason code (see A.19.31)
Bytes 6 to 8:		Reserved

B.6.6 Secondary or front hitch yaw command

This message provides control of front hitch yaw.

Transmission repetition rate:	100 ms
Data length:	8 bytes
Data page:	0
PDU format:	241
PDU specific:	62
Default priority:	3